

PATENT ABSTRACTS OF JAPAN

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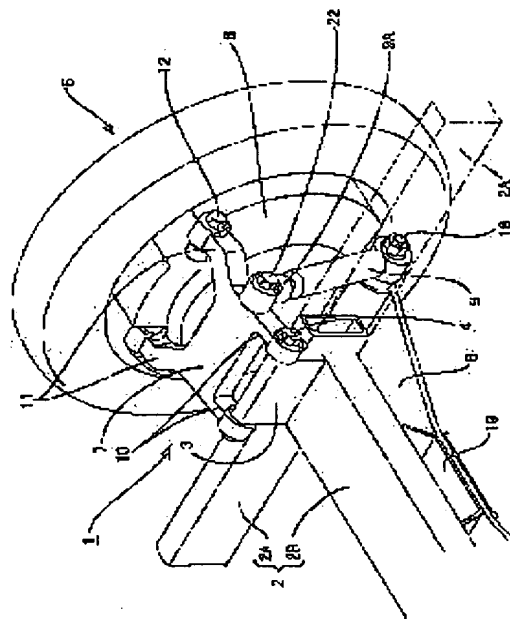
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(54) SUSPENSION DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a suspension device allowing reduction of the number of components to improve installability and having sufficient strength.

SOLUTION: A wheel part 6 of a wheel 5 is provided with a pair of upper and lower installation shafts 12, 18 along the back-and-forth direction of a vehicle. An H-shaped suspension arm 7 is rotatably installed between an upper space of a vehicle body frame 2 and the upper installation shaft 12. A leaf spring 8 is extendedly provided from a lower part of the vehicle body frame 2, while an end part of the leaf spring 8 is turnably wound around the lower installation shaft 18. A shock absorber 9 is expandably and retractably installed between the center of the suspension arm 7 and the lower installation shaft 18.



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CLAIMS

[Claim(s)]

[Claim 1] The suspension arm which supports the wheel section of a wheel is suspension equipment arranged only on the upper side space between the upper part side location of said wheel section, and a car-body frame. While the central part of the leaf spring arranged on the cross direction is attached in said car-body frame The edge of this leaf spring is suspension equipment characterized by attaching in the lower part side location of said wheel section, connecting rotatable through a shaft, and connecting the lower limit section of a shock absorber to this anchoring shaft rotatable further.

[Claim 2] said suspension arm -- both sides -- respectively -- two forks -- the suspension equipment according to claim 1 with which each connection arm is characterized by connecting the same axle to the circumference of the shaft of a nothing parenthesis rotatable by the cross direction of a car, respectively to said car-body frame side and said wheel section while the whole makes an abbreviation H mold and is formed with the connection arm which branches in a **.

[Claim 3] Said wheel section is suspension equipment given in either of claims 1 or 2 characterized by being motor casing of the in wheel motor with which it was equipped inside the wheel of said wheel.

[Claim 4] The upper limit section of said shock absorber is suspension equipment according to claim 1 to 3 characterized by being attached in said suspension arm.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to suspension equipment.

[0002]

[Description of the Prior Art] Recently, various kinds of techniques are developed about the electric vehicle. Although the structure of a gasoline engine vehicle is adopted as it is fundamentally, in order to extend the distance it can run by charge once, to be lightweight-ized structure is demanded strongly. For example, the thing of the structure called a double wish bone which connects an upper part [of the wheel section of a wheel] and lower part side by the suspension arm of a pair a car-body frame side is known for the suspension equipment of the automobile known conventionally.

[0003]

[Problem(s) to be Solved by the Invention] Although a double wish bone type is excellent in steering nature, it is high also in cost to need an arm for upper Roa, respectively etc., and it causes an increase of weight. This invention is made in view of the above-mentioned situation, and the purpose is in offering the suspension equipment which can aim at the decrease of cost, and weight reduction.

[0004]

[Means for Solving the Problem] The suspension equipment applied to invention of claim 1 in order to solve the above-mentioned technical problem The suspension arm which supports the wheel section of a wheel is what is allotted only to the upper side space between the upper part side location of said wheel section, and a car-body frame. On said car-body frame While the central part of the leaf spring arranged on the cross direction is attached It is characterized by attaching the edge of this leaf spring in the lower part side location of said wheel section, connecting rotatable through a shaft, and connecting the lower limit section of a shock absorber to this anchoring shaft rotatable further.

[0005] invention of claim 2 -- a thing according to claim 1 -- it is -- said suspension arm -- both sides -- respectively -- two forks -- while the whole makes an abbreviation H mold and is formed with the connection arm which branches in a **, each connection arm is characterized by connecting the same axle to the circumference of the shaft of a nothing parenthesis rotatable by the cross direction of a car, respectively to said car-body frame side and said wheel section.

[0006] Invention of claim 3 is a thing given in either of claims 1 or 2, and said wheel section is characterized by being motor casing of the in wheel motor with which it was equipped inside the wheel of said wheel. Invention of claim 4 is a thing according to claim 1 to 3, and the upper limit section of said shock absorber is characterized by being attached in said suspension arm.

[0007]

[An operation of invention, and an effect of the invention] According to invention of claim 1, the wheel section of a wheel is supported to a car-body frame with the suspension arm by the side of an upper, and the leaf spring by the side of the lower part. That is, in order that the leaf spring replaced with and used for the conventional coil spring may demonstrate a part of function as a lower control arm, cost reduction and the decrease of weight are planned.

[0008] The Roa side is using H mold arm in claim 2, in order to compensate the lack of support, since it is supported with the leaf spring. Since such an H mold arm is supported by two points to each with the wheel section a car-body frame side compared with A arm conventionally used for a double wish bone type, reinforcement is strengthened. Since connection by the side of a wheel and a car-body frame is performed using motor casing of an in wheel motor according to invention of claim 3, it is not necessary to prepare the member for connection in others. According to invention of claim 4, since it is attached in the suspension

arm, the upper limit of a shock absorber can reduce the floor side of a car, when attaching in a car-body frame, and can secure space in the car widely. This becomes effective when manufacturing a small automobile especially.

[0009]

[Embodiment of the Invention] Next, the operation gestalt of this invention is explained to a detail, referring to drawing 1 - drawing 3 . The perspective view of the suspension equipment 1 of this operation gestalt was shown in drawing 1 . Suspension equipment 1 connects the car-body frame 2 and the wheel section 6 of a wheel 5, and consists of a suspension arm 7 with which the space by the side of an upper is equipped, a leaf spring 8 with which a lower part side is equipped, and a shock absorber 9.

[0010] The car-body frame 2 is equipped with side-member 2A of the pair arranged at a cross direction at the right-and-left edges on both sides of the car which is not illustrated, and cross-member 2B constructed among both side-members 2A. In the end section of cross-member 2B in drawing, side-member 2A and the place attached are equipped with the bracket 3 of the length equal to cross-member 2B order the length. The upper limit of this bracket 3 is equipped with the up anchoring shaft 4 along with the cross direction of a car.

[0011] Inside the wheel section 6 of a wheel 5, as shown in drawing 2 , it is equipped with the in wheel motor 13 which makes a car drive. That is, with this operation gestalt, motor casing of the in wheel motor 13 has composition which serves as the wheel section 6. The in wheel motor 13 and the wheel 5 are connected rotatable through the revolving shaft 14. Moreover, the brake mechanism 15 is allotted to the building envelope by the side of the wheel 5 in the wheel section 6, and a brake drives to it by towage of the wire shown by 16 in drawing. Moreover, the anchoring shafts 12 and 18 of a pair are formed in the upper part [of the wheel section 6], and lower part side. Among these, while a suspension arm 7 is attached in the up anchoring shaft 12, the end section of a leaf spring 8 is attached in the lower anchoring shaft 18 (it corresponds to the "anchoring shaft" in this invention.).

[0012] The suspension arm 7 is formed in the abbreviation H mold at one, and the space by the side of the upper of the car-body frame 2 and a wheel 5 is equipped with it. From the suspension arm 7, the connection arms 10 and 11 are installed toward the car-body frame 2 side and the wheel 5 side, respectively. among these, the car-body side connection arm 10 installed in the car-body frame 2 side -- two forks -- the wheel side connection arm 11 installed in a wheel 5 side while being branched and prepared in the ** -- the same - - two forks -- it is branched and prepared in the **. As the car-body side connection arm 10 of a pair sandwiches a bracket 3 from the cross direction of a car, it is attached in the up anchoring shaft 4, and it is made rotatable in the vertical direction by setting this anchoring shaft 4 as a rotation core. Moreover, the wheel side connection arm 11 of a pair is attached in the vertical direction rotatable at the up anchoring shaft 12 of a wheel 5. In this way, to the wheel section 6 and the car-body frame 2, by the cross direction of a car, as both the connection arms 10 and 11 make the same axle, they are attached rotatable up and down, respectively.

[0013] Moreover, the absorber anchoring shaft 22 is established in the center of a suspension arm 7, and the upper limit section of a shock absorber 9 is attached here rotatable. In addition, although not illustrated in a detail, oil is enclosed with the interior of a shock absorber 9, and the interior of the oil is equipped with the cylinder. The upper part of the cylinder is projected outside as upper limit attachment section 9A of a shock absorber 9. Further in addition, although not shown in a detail, if a wheel 5 is attached to a pair and the thing of the configuration completely same about right and left of the car-body frame 2 sees it about the wheel 5 on either side, the shock absorber 9 is attached to the cross direction by point symmetry.

[0014] The leaf spring 8 is formed of the spring material of the shape of a strip equipped with predetermined elasticity, and the central part is attached with the bolt 20 and the nut 21 to the central bracket 19 attached in the lower limit of cross-member 2B. Moreover, the both ends of a leaf spring 8 are made rotatable while they are twisted around the lower anchoring shaft 18 of a wheel 5, respectively, and they can receive elastically the variation rate to the vertical direction of a wheel 5. Moreover, the lower limit section of a shock absorber 9 is attached in the end section of this lower anchoring shaft 18 rotatable. In this way, the shock absorber 9 is attached to the absorber anchoring shaft 22 of a suspension arm 7, and the lower anchoring shaft 18 of a wheel 5 respectively rotatable and possible [telescopic motion among both the anchoring shafts 22 and 18].

[0015] Next, the operation and effectiveness of this operation gestalt which were constituted as mentioned above are explained. The suspension arm 7 and leaf spring 8 which it has between the car-body frame 2 and a wheel 5 can receive vibration which starts a wheel 5 with the drive of a car. Moreover, the shock absorber 9 prepared between the suspension arm 7 and the leaf spring 8 absorbs vibration of both the members 7 and

8 by expanding and contracting at this time.

[0016] Thus, according to this operation gestalt, the wheel section 6 of a wheel 5 is supported to the car-body frame 2 with the suspension arm 7 by the side of an upper, and the leaf spring 8 by the side of the lower part. That is, it replaces with the conventional coil spring, and in order that the leaf spring 8 used with this operation gestalt may demonstrate a part of function as a lower control arm, cost reduction and the decrease of weight are planned. The Roa side is using the suspension arm 7 of H mold for an upper side, in order to compensate the lack of support, since it is supported with the leaf spring 8. Since such an H mold arm is supported by two points to each with the wheel section 6 the car-body frame 2 side compared with A arm conventionally used for a double wish bone type, reinforcement is strengthened.

[0017] Furthermore, since connection by the side of a wheel 5 and the car-body frame 2 is performed using motor casing of the in wheel motor 13, it is not necessary to prepare the member for connection in others. In addition, since the upper limit of a shock absorber 9 is attached in the suspension arm 7, when attaching in the car-body frame 2, it can reduce the floor side 23 of a car, and can secure space in the car widely. This becomes effective when manufacturing a small automobile especially.

[0018] Other operation gestalten in this invention were shown in operation gestalt > drawing 4 besides <. In addition, the same sign was attached about the same configuration as the above-mentioned operation gestalt. With other operation gestalten, upper limit section 9A of a shock absorber 9 is attached rotatable to the absorber anchoring shaft 30 of the car-body frame 2, and the shock absorber 9 is constructed possible [telescopic motion] between the car-body frame 2 and the leaf spring 8. Thus, also in other constituted operation gestalten, the same operation and effectiveness as the above-mentioned operation gestalt can be done so.

[0019] This invention is not limited to said operation gestalt, and a thing which is indicated below is also contained in the technical range of this invention.

(1) With this operation gestalt, although the suspension device is used for the electric vehicle, according to this invention, you may apply to the suspension device of a gasoline-powered vehicle.

(2) With this operation gestalt, although the suspension device is used for the electric vehicle of an in wheel motor format, according to this invention, it is applicable also to the electric vehicle of other formats.

(3) With this operation gestalt, although the suspension arm of an abbreviation H mold is used, according to this invention, the conventional A arm may be used.

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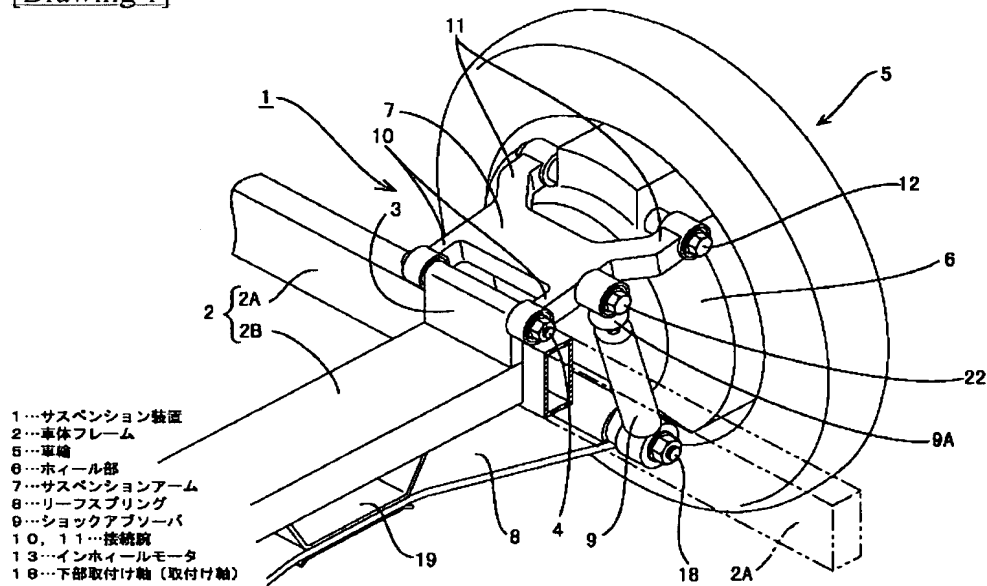
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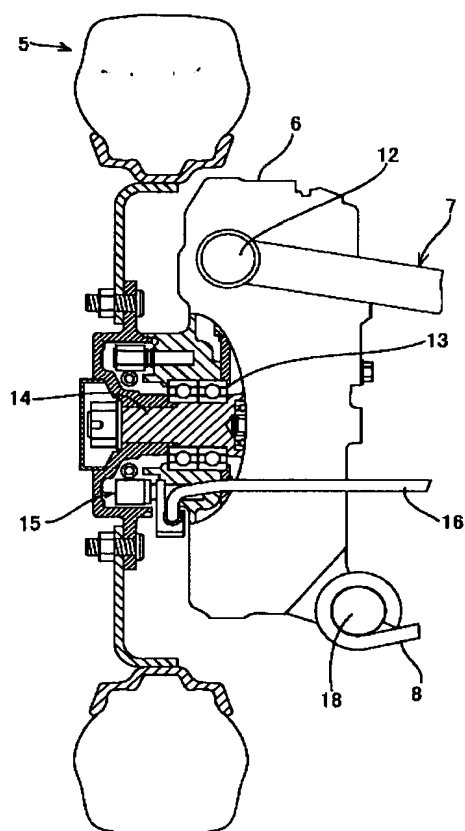
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DRAWINGS

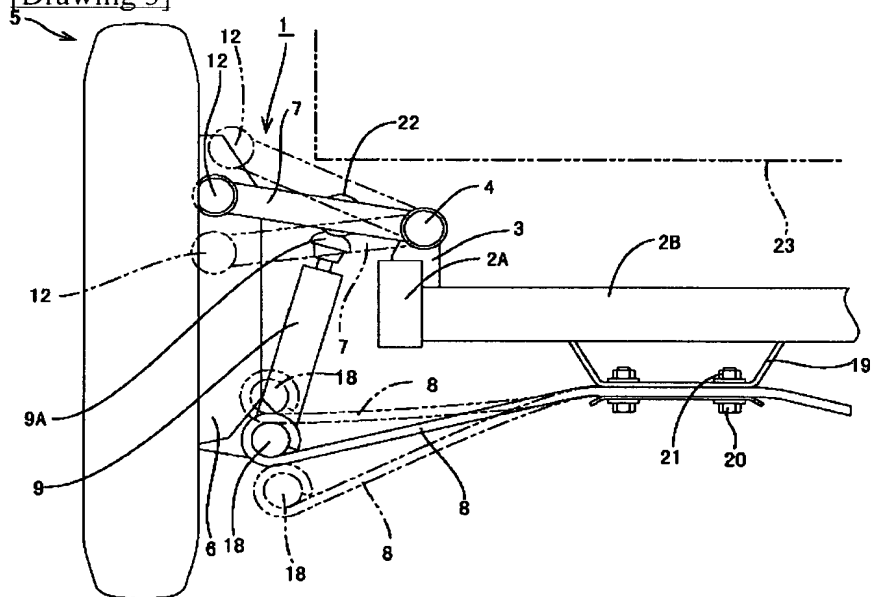
[Drawing 1]



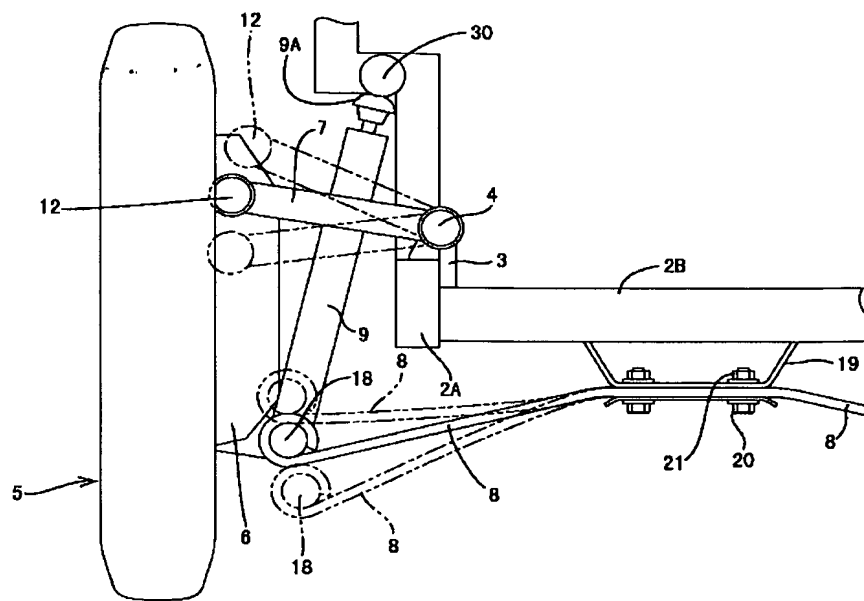
[Drawing 2]



[Drawing 3]



[Drawing 4]



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